

# (12) UK Patent Application (19) GB (11) 2 152 585 A

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(56) Documents cited  
GB A 2006340 GB 1422310 GB 0893294  
GB 1589806 GB 1304907 GB 0608195

(58) Field of search  
F1D

## (54) Locking hydraulic jacks

(57) The present invention provides an anti-drop safety device for an hydraulic jack including an hydraulically operable raising rod (27) serving to raise a load. More particularly, the device comprises a conical sleeve (24) around the raising rod (27) which sleeve is longitudinally split so as to be contractable (and expandable) the sleeve (24) being located in a conical opening (23) in a jack top part (21). The sleeve (24) carries a fine internal thread which can mesh with a similar external thread on the rod (27) in a rod holding mode when the sleeve is contracted. Sleeve contraction can be achieved by a co-operating axially movable cap (26) screwed on the top part (21), or alternatively by a radially movable member supported on the cap (26) carried by the jack top part (21).

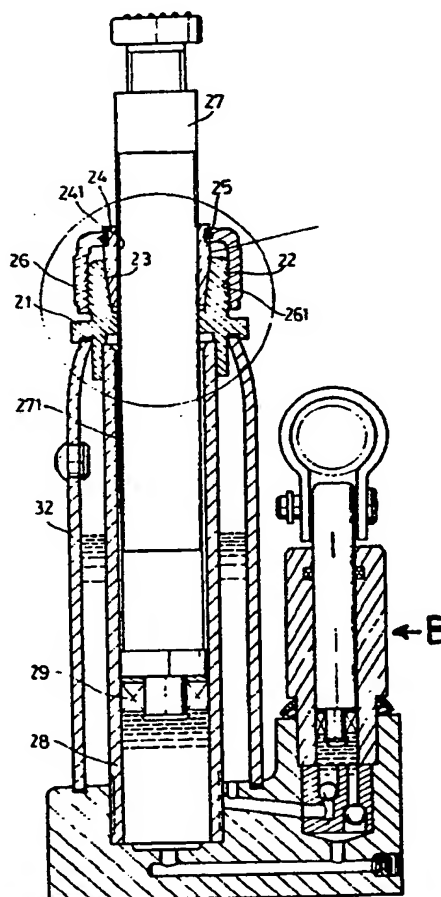


Fig.-2

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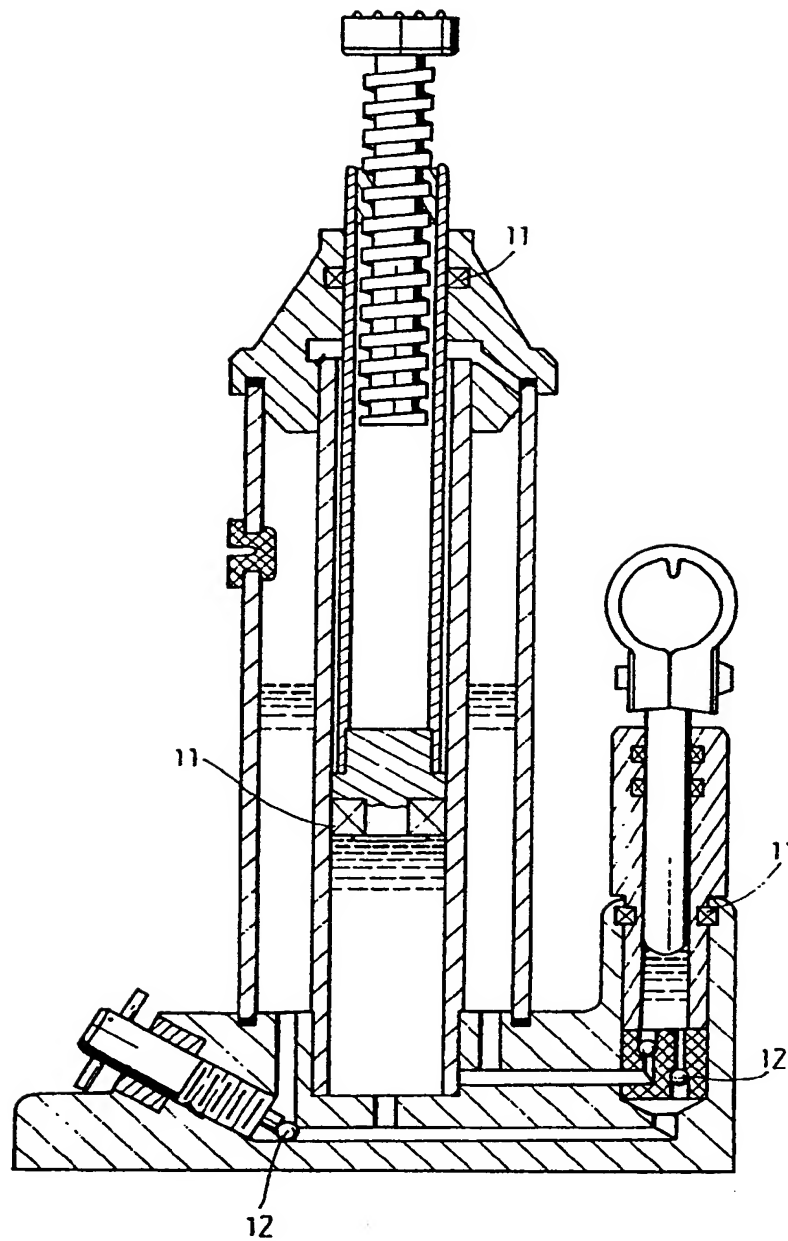


Fig.-1

Fig-2C

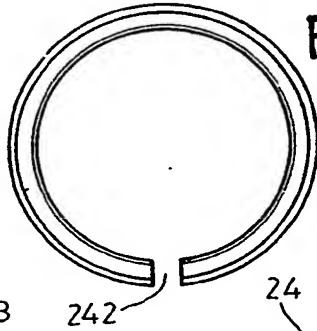
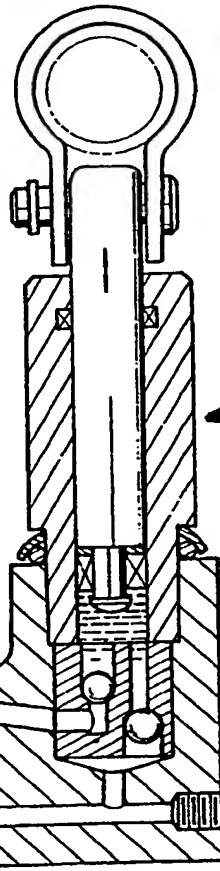


Fig-2B



← B

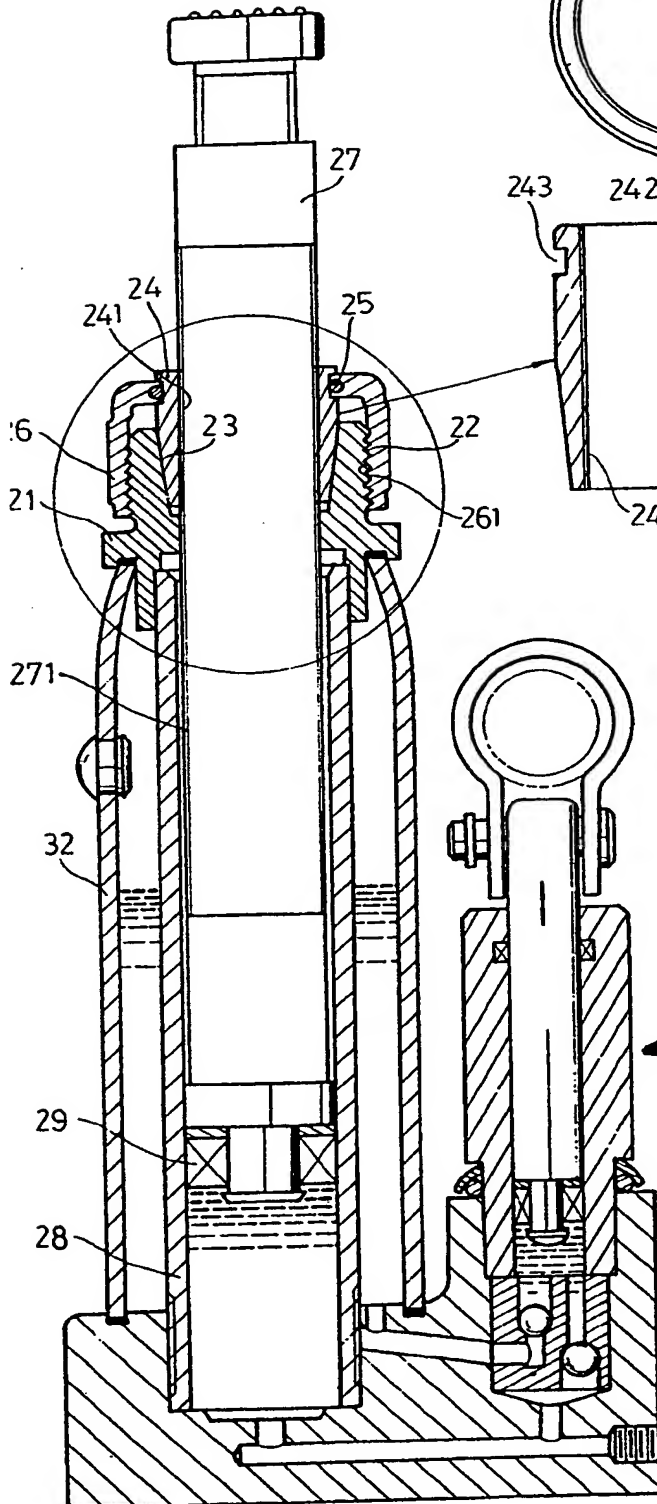


Fig.-2

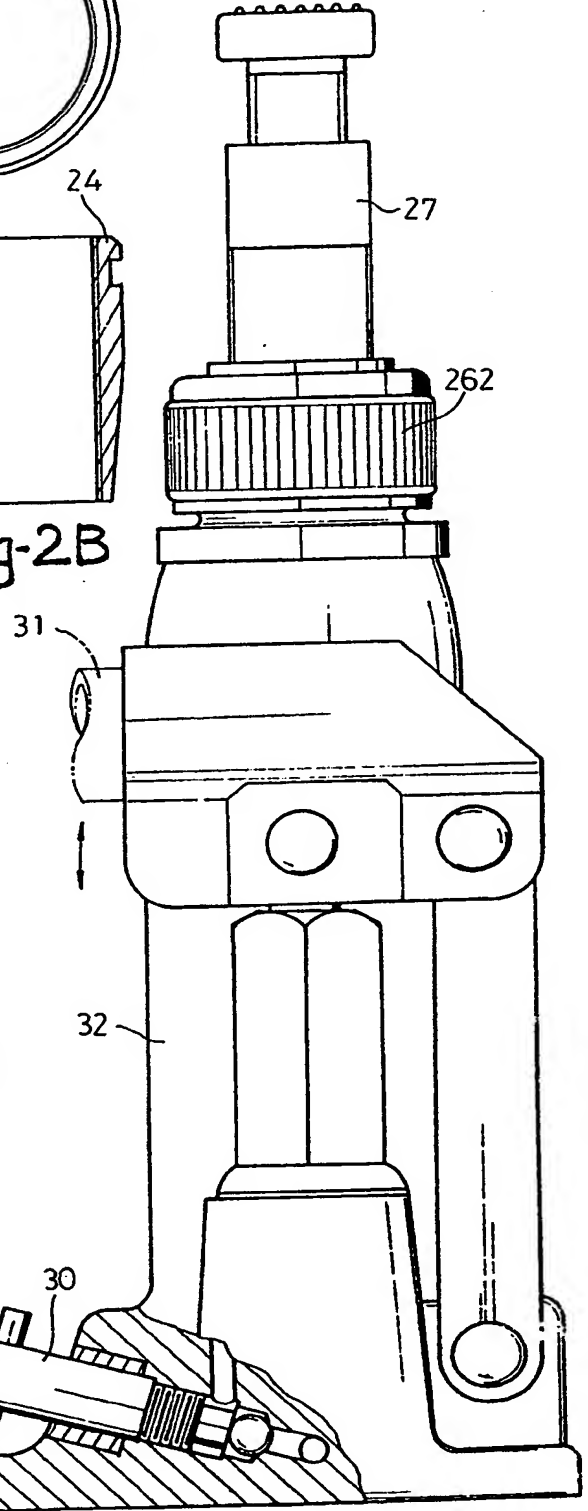


Fig-2A

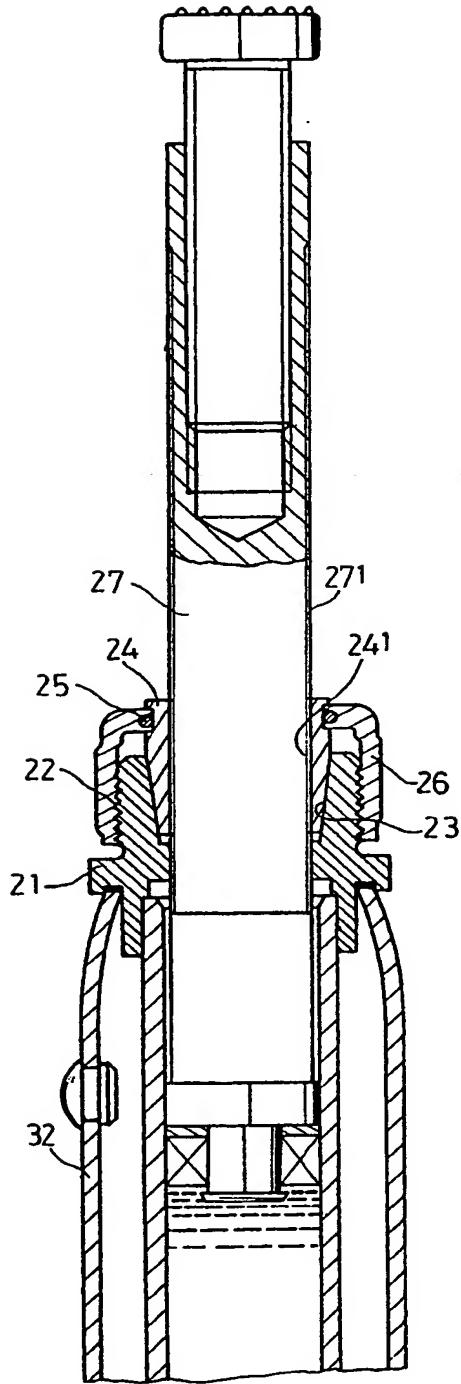


Fig.-3

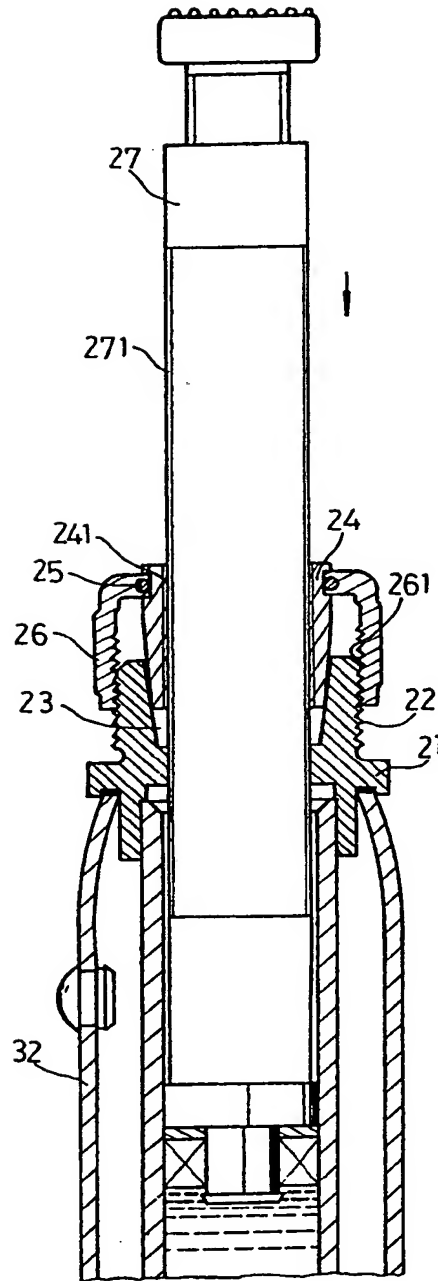


Fig.-4

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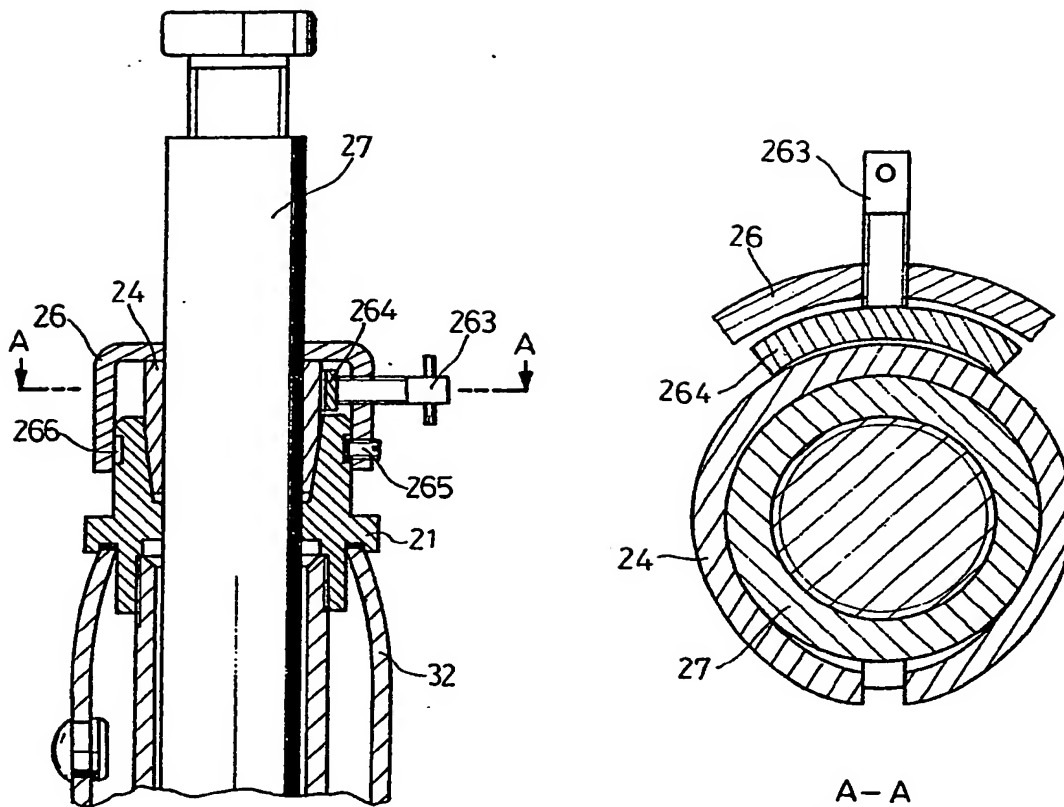


Fig.-5

## SPECIFICATION

### Anti-drop safety device for an hydraulic jack

5 This invention relates to an anti-drop safety device for an hydraulic jack which jack includes an hydraulically operable raising rod.

#### 10 Background of the Invention

In the use of an hydraulic jack to raise a load, the oil seals and valve balls in the jack cylinder can be subjected to a pressure as high as 350–700 Kg/cm<sup>2</sup>. Under such a high pressure, the stop valve of oil seals and balls tends to fatigue wear and leakage will take place. A sudden drop of the load due to leakage can cause damage and injury. Many improvements have been proposed to the jack but none has satisfactorily eliminated this danger. It is an object of the present invention to provide a safety device for an hydraulic jack which substantially obviates or mitigates this disadvantage.

#### 25 Summary of the Invention

According to the present invention there is provided an anti-drop safety device for an hydraulic jack which jack includes an hydraulically operable raising rod; said safety device comprising a contractable collar fittable on the raising rod, and actuating means for placing the collar in a contracted condition on the raising rod whereby the jack is placed in an anti-drop mode.

Preferably, the contractable collar comprises a conical sleeve to be fitted in a conical opening in the top of a jack holder element said sleeve including an external thread, said actuating means including an adjusting screw cap or screw lever for pressing the said sleeve and causing its thread to engage with an external thread on the raising rod on which the sleeve is fitted, so as to hold the raising rod and to assist in the support of the load.

The above device of the present invention provides an anti-drop safety device for an hydraulic jack which ensures safe operation of the jack and prevents damage and injury. Specifically, the device provides a holding and supporting mechanism at the top of the jack holder to share the load with the fluid force in the jack cylinder, to thereby reduce the pressure on the seals, prolong the life of the hydraulic jack, and ensure the safety of the operator. This invention provides a jack anti-drop device which secures the raising of load, prevents sudden drop of the load due to oil leakage caused by worn or damaged oil seals or valve balls in the pipe line, and ensures safe operation.

#### Brief Description of the Drawings

Embodiments of the present invention will now be described by way of example with

reference to the accompanying drawings in which:

Figure 1 is a sectional side view of a conventional hydraulic jack;

70 Figure 2 is a sectional side view of a hydraulic jack embodying a safety device according to one embodiment of the present invention.

Figure 2A shows an end view of the jack of Fig. 2 looking in the direction of arrow B;

Figure 2B shows the encircled detail of Fig. 2 to a larger scale;

Figure 2C shows a plan view of Fig. 2B;

80 Figure 3 and Figure 4 show a portion of Fig. 2 illustrating the operation of the safety device of this invention.

Figure 5 shows a portion of the jack of Fig. 2 but including a modification according to another embodiment of the present invention.

85 Figure 5B shows the section A–A of Fig. 5.

#### Description of the Preferred Embodiments

This invention provides an anti-drop safety device for a hydraulic jack the device especially comprising a sleeve with fine thread for meshing with the fine thread on the jack raising rod so as to support the load together with the fluid force in the jack cylinder. Referring now to the drawings, detailed description is made as follows. As shown in Fig. 1, when a conventional jack is raising a load, the oil seals 11 in the cylinder can be subjected to pressure of about 350–700 Kg/cm<sup>2</sup>. Under such a high pressure, the stop valve mechanism comprising oil seals 11 and valve balls 12 tend to wear or become damaged after a certain period of time and oil leakage will occur. As soon as there is failure to maintain sealing completely, a sudden drop of the raising rod will take place. Therefore a conventional hydraulic jack cannot ensure satisfactory safety of operation. This disadvantage is a cause of considerable concern in the industry.

110 The present invention provides a safety device that is a mechanism added to the holder of a conventional hydraulic jack to share the load on the raising rod with the fluid force in the cylinder so as to reduce the pressure in the cylinder and on the oil seals, secure the jack in the raised condition, and ensure safety of operation.

Referring to Fig. 2, a holder 21 of the hydraulic jack has its top or head made with an external male thread 22 and a downward-tapering conical opening 23 in which a conical sleeve 24 is fitted. The conical sleeve 24 has 0.2 m/m thread 241 on its inside, a longitudinal slot 242, a circular recess 243 for fixing to the adjusting screw cap 26 with a wire retaining ring 25. The adjusting screw cap 26 has female thread 261 on its inside to be meshed with the male thread 22 on the holder. The adjusting cap 26 also has a notched surface 262 to facilitate turning. The

raising rod 27 with 0.2 m/m thread 271 extends through the sleeve into the cylinder 28. The raising rod 27 has an oil seal 29 at its end to achieve oil-tightness and to prevent oil leakage.

The oil seals and valve balls of a conventional hydraulic jack of which oil tightness is essential for raising the load and keeping the raising rod from dropping will lose their tightness and become leaky due to elastic fatigue or wear. This will result in the danger of a sudden load drop. Up till now this problem has not been satisfactorily solved. This invention uses the conical sleeve 24 which will be tightened by means of the adjusting screw cap (26) and have its internal thread 241 engaged with the external thread 261 of the raising rod when the raising rod 27 lifts to a desired position so as to prevent the raising rod 27 from dropping.

Fig. 3 shows the operation of the safety device when the raising rod 27 is lifting a load. After the return oil tap 30 is tightened, the lever 31 is reciprocated up and down and forces the oil in the outer cylinder 32 into the inner cylinder 28. The raising rod 27 is forced up and raises the load. When it reaches a desired level, the adjusting screw cap 26 is tightened and forces the conical sleeve 24 down. Since the sleeve 24 has a longitudinal slot, it moves downward along the conical opening 23 and presses against the raising rod 27 until rotation of the adjusting cap ceases. Consequently, the threads of the sleeve 24 and the raising rod 27 are placed in close mesh and hold the raising rod 27 tightly. This helps to support the raising rod, reduces the pressure in the cylinder and the damage of oil seals and valve balls, and prevents the raising rod from dropping even when there is damage or an oil leak.

Fig. 4 shows the lowering mode of the raising rod with the release of fluid pressure. As the sleeve 24 has engaged the raising rod 27 tightly in raising the load, it is necessary to reciprocate the lever to make the raising rod lift a little so as to loosen the engagement of threads 241 and 261 of conical sleeve 24 and the raising rod 27. Then the adjusting screw cap 26 is rotated upwardly. Since the conical sleeve is elastic and has a longitudinal slot, it resumes its normal shape with the reduction of pressure. Thus the sleeve 24 disengages the raising rod 27. After the return oil tap 30 is loosened the raising rod 27 drops and returns to its lowered position.

Accordingly, the anti-drop safety device for a hydraulic jack of the above embodiment of this invention comprises a conical sleeve fitted at the top of the jack holder and over the raising rod which can be tightened by means of an adjusting screw cap to have an internal thread in engagement with an external thread of the raising rod so as to hold the raising rod, share the load with the oil force, reduce

the wear of oil seals and valve balls, prolong the life of hydraulic jack, and ensure safety of operation. Referring to Fig. 5, the engagement of the female thread and the male thread of the adjusting screw cap 26 and the holder 21, for example, can alternatively be achieved by a locating and clamping mechanism which comprises a circular recess 266 made on the top perimeter of the holder 21, an adjusting cap 26 with a screw hole in its side for a hexagonal headed screw 265 which is received in the recess 266 to locate the cap 26 after the cap 26 is fitted over the holder 21, and a screw lever 263 on the cap 26 for pressing a block 264 onto the threaded sleeve 24 to thereby cause the threaded sleeve 24 to mesh with the threaded raising rod 27 similarly as in the first embodiment so as to hold the raising rod 27 and to prevent it from dropping when oil leakage occurs.

It will be understood of course, that the above embodiments are only preferred applicative examples, and the invention is not limited to the specific constructions shown in these examples and indeed further modifications would be possible.

#### CLAIMS

1. An anti-drop safety device for an hydraulic jack which jack includes an hydraulically operable raising rod; said safety device comprising a contractable collar fittable on the raising rod, and actuating means for placing the collar in a contracted condition on the raising rod whereby the jack is placed in an anti-drop mode.

2. An anti-drop safety device as claimed in claim 1, wherein the contractable collar comprises a conical sleeve to be fitted in a conical opening in the top of a jack holder element said sleeve including an external thread, said actuating means including an adjusting screw cap or screw lever for pressing the said sleeve and causing its thread to engage with an external thread on the raising rod on which the sleeve is fitted so as to hold the raising rod and to assist in the support of the load.

3. An anti-drop safety device according to claim 2, in which said conical sleeve has a fine thread on its inside, a longitudinal slot and a circular recess for a wire retaining ring to fix on the adjusting screw cap and is sufficiently elastic to be tightened and released.

4. An anti-drop safety device according to claim 2, in which said raising rod has a fine thread on its outside to mesh with the thread on the sleeve so that it can be held and supported firmly.

5. An anti-drop safety device for use in a hydraulic jack, substantially as hereinbefore described with reference to and as illustrated in Figs. 2 to 4 or Figs. 5 and 5A of the accompanying drawings.

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